



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants:	Mark Cullen)	Confirmation No.	6075
)		
Serial No.:	10/644,255)	Art Unit:	1764
)		
Filed:	August 20, 2003)	Examiner:	Tam M. Nguyen
)		
For:	Treatment of Crude Oil Fractions,)		
	Fossil Fuels & Products Thereof)		

APPEAL BRIEF UNDER 37 C.F.R. § 41.37

Mail Stop Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir/Madam:

Applicant [hereinafter "Appellant"], in the above-captioned patent application, has appealed from the Examiner's final rejection of Claims 22-88 as set forth in the Final Office Action of March 14, 2006.

An Amendment was filed under 37 C.F.R. § 1.116(b) on March 20, 2006, *inter alia*, canceling Claims 22-39 and a Notice of Appeal in response to the Final Office Action was filed on March 29, 2006. The Appeal Brief is being submitted with the requisite fee under 37 C.F.R. § 41.20(b)(2) in the amount of \$250.00. An ORAL HEARING IS NOT PRESENTLY BEING REQUESTED.

If for any reason the necessary fee is not associated with this file, the Commissioner is authorized to charge the appropriate fee for the Appeal Brief and/or any necessary extension of time fees to Deposit Account Number 19-4330.

TABLE OF CONTENTS

I.	REAL PARTY IN INTEREST	3
II.	RELATED APPEALS AND INTERFERENCES.....	3
III.	STATUS OF CLAIMS	3
IV.	STATUS OF AMENDMENTS	3
V.	SUMMARY OF CLAIMED SUBJECT MATTER	3
VI.	GROUND OF REJECTION TO BE REVIEWED ON APPEAL	4
VII.	ARGUMENT	5
VIII.	CLAIMS APPENDIX.....	27
IX.	EVIDENCE APPENDIX.....	33
X.	RELATED PROCEEDINGS APPENDIX	33
XI.	CONCLUSION.....	34

I. REAL PARTY IN INTEREST

The real party in interest is Petrosonics, LLC by assignment recorded in the U.S. Patent and Trademark Office on April 18, 2006 at Reel 017486, Frame 0704.

II. RELATED APPEALS AND INTERFERENCES

Appeals are pending on United States Patent Application Numbers 10/411,796 and 10/429,369, which have the same Applicant, are owned by the same Assignee, and are directed toward similar subject matter.

III. STATUS OF CLAIMS

Claims 22-88 stand finally rejected. In the Amendment filed on March 20, 2006, Claims 22-39 were cancelled. Claims 40-88 are hereby being appealed.

IV. STATUS OF AMENDMENTS

Applicant's Amendment filed on March 20, 2006, after the final rejection, has been entered by the Examiner.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The independent claims of the present application relate to processes for upgrading a crude oil fraction to improve the performance and enhance the utility of the crude oil fraction, wherein the upgrade is effected by heating the crude oil fraction while simultaneously exposing it to sonic energy in specific types of reaction mediums. *See*

specification p. 9, lines 5-11; specification p. 5, lines 15-19. More particularly, the process claimed in independent Claim 40 includes the presence of an oxidizing agent and the absence of an aqueous phase. *See specification p. 5, lines 15-19; specification p. 10, line 31 through p. 11, line 2.* The process claimed in independent Claim 58 includes the presence of an oxidizing agent and the absence of a surface active agent. *See specification p. 5, lines 15-19; specification p. 11, lines 16-17.* The process claimed in independent Claim 76 includes the absence of an oxidizing agent. *See, e.g., specification p. 6, lines 19-23.*

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

- A. Whether Claims 76 and 83-88 are improperly rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 3,616,375 to Inoue (hereinafter “Inoue”);
- B. Whether Claims 40-57 are improperly rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,500,219 to Gunnerman (hereinafter “Gunnerman”);
- C. Whether Claims 58-75 are improperly rejected under 35 U.S.C. § 103(a) as being unpatentable over Gunnerman;
- D. Whether Claims 78-88 are improperly rejected under 35 U.S.C. § 103(a) as being unpatentable over Gunnerman;
- E. Whether Claims 77-81 are improperly rejected under 35 U.S.C. § 103(a) as being unpatentable over Inoue in view of Gunnerman; and
- F. Whether Claim 82 is improperly rejected under 35 U.S.C. § 103(a) as being unpatentable over Inoue alone or in view of Gunnerman.

VII. ARGUMENT

A. The rejection of Claims 76 and 83-88 under 35 U.S.C. § 102(b) as being anticipated by Inoue is in error, the rejection should be reversed, and the subject application should be remanded to the Examiner with instructions to allow Claims 76 and 83-88.

i. The Examiner's Rejection of Independent Claim 76

The Examiner submits in the Final Office Action of March 14, 2006 that Inoue discloses a desulfurization process wherein a hydrocarbon feed (e.g., crude oil) is contacted with ultrasonic energy, wherein the process is operated at ambient temperature and pressure. *See col. 1, lines 27-38; col. 2, lines 20-44; col. 5, lines 5-8; Examples I-V.*

ii. A Review of Inoue

Inoue discloses a method for removing sulfur from petroleum liquids by exposing the liquids to high-energy sources without substantially heating the liquids. *See col. 1, lines 51-64.* Inoue discloses that sonic vibrations alone or in combination with some other high-energy source can result in the desulfurization of the petroleum liquids. *See col. 2, lines 34-43.* Inoue also discloses that in spite of using a high-energy discharge the liquid is only minimally heated from the process and the reaction effectively occurs at ambient temperature and pressure. *See col. 2, lines 30-33.*

iii. Appellant's Independent Claim 76

Appellant's independent Claim 76 recites, *inter alia*, [a] process for *upgrading* a crude oil fraction *to improve the performance and enhance the utility* of the crude oil fraction, said process comprising the step of heating said crude oil fraction ... The aforementioned features recited in independent Claim 76 are not taught or suggested by Inoue.

a. *The Inoue patent does not teach heating a crude oil fraction*

The rejection of independent Claim 76 as anticipated by Inoue is untenable. Independent Claim 76 specifically requires the step of heating the crude oil fraction while exposing the crude oil fraction to sonic energy. Inoue, in contrast, fails to teach heating the crude oil fraction while applying sonic energy. Inoue states that its method, “may be used to treat the sulfur-containing liquid without substantial heating thereof,” (Col. 1, lines 57-59) (emphasis added) and that, “in spite of the use of high-energy discharge, it has been found to be possible to keep the heating of the liquid at a minimum so that the reaction effectively takes place at ambient temperature or pressure.” *Col. 2, lines 30-33* (emphasis added). In fact, the Examiner conceded that the Inoue “process is operated at ambient temperature and pressure.” *Final Office Action p. 4*.

As such, the Inoue reference does not teach all of the limitations present in Appellant's independent Claim 76. As is well known, a prior art reference cannot anticipate in terms of 35 U.S.C. § 102 unless every element of the claimed invention is identically shown in a single reference. *In re Bond*, 15 U.S.P.Q. 2d, 1566, 1567 (Fed. Cir 1990); *MPEP*

§ 2131. Therefore, Appellant submits that the Examiner has failed to establish an adequate evidentiary basis to support an anticipation rejection under 35 U.S.C. § 102(b), and that the current rejection of independent Claim 76 is improper and should be withdrawn.

b. *The Inoue patent teaches away from heating the crude oil fraction*

Not only does the Inoue reference not teach the limitation of heating the crude oil fraction as required by Appellant's independent Claim 76, the Inoue reference actually teaches away from heating the crude oil fraction. Inoue states that, "thermal treatments are expensive and may, if carried out extensively, severely modify the composition of the oil." *Col. 1, lines 32-33*. Accordingly, there would be no motivation whatsoever to modify the Inoue reference to teach all of the limitations present in Appellant's independent Claim 76. It is well known that when analyzing an invention for obviousness the prior art must be considered in its entirety, including disclosures that teach away from the claims. MPEP § 2141.02. As such, any 35 U.S.C. § 103(a) rejection of Appellant's independent Claim 76 would also be improper.

iv. *Appellant's Dependent Claims 83-88*

Further, Appellant submits that Claims 83-88 are allowable at least for the reason that these claims depend from an allowable base claim and recite additional features that further define the present invention.

Accordingly, Appellant respectfully requests that the Board reverse the rejection of dependent Claims 83-88 under 35 U.S.C. § 102(b) and remand the subject application to the Examiner with instructions to allow such claims.

B. The rejection of Claims 40-57 under 35 U.S.C. § 103(a) as being unpatentable over Gunnerman is in error, the rejection should be reversed, and the subject application should be remanded to the Examiner with instructions to allow Claims 40-57.

i. *The Examiner's Rejection of Independent Claim 40*

The Examiner submits in the Final Office Action of March 14, 2006 that Gunnerman discloses a process for removing sulfur from a hydrocarbon feed by preheating the feed and contacting it with an oxidizing agent while exposing the feed to sonic energy and a nickel or tungsten catalyst at a residence time of from about 0.3 minutes to about 30 minutes at a temperature of from 70°C to 80°C at about atmospheric pressure. *See col. 3, lines 18-45; col. 4, lines 38-47; col. 5, line 23 through col. 6, line 37; example 1.*

However, *the Examiner concedes that Gunnerman does not disclose that the process is operated in the absence of an aqueous phase.* *See Final Office Action p. 5.* To satisfy this feature, the Examiner submits that at the time the invention was made it *would have been obvious* to one having ordinary skill in the art to have modified the Gunnerman process by operating the process in the absence of an aqueous phase if the function of the aqueous phase is undesirable. *See Final Office Action p. 5.*

ii. *A Review of Gunnerman*

Gunnerman provides a method for reducing the sulfur content of a fossil fuel by applying ultrasound to a multiphase reaction medium containing the fossil fuel along with an

aqueous fluid, a hydroperoxide oxidizing agent, and a surface active agent. *See col. 2, lines 26-30.* After receiving the ultrasound treatment, the reaction medium spontaneously separates into an organic phase, the latter now containing the desulfurized fossil fuel, and a separate aqueous phase, now containing the sulfur compounds. *See col. 2, lines 31-43.*

iii. Appellant's Independent Claim 40

Appellant's independent Claim 40 recites, *inter alia*, a process for *upgrading* a crude oil fraction to *improve the performance and enhance the utility* of the crude oil fraction, said process comprising...exposing said crude oil fraction to sonic energy *in the absence of an aqueous phase*. The aforementioned features recited in independent Claim 40 *are not taught or suggested by Gunnerman*.

a. *There is no evidence supporting the motivation to modify the Gunnerman reference to be practiced without the use of an aqueous phase*

Gunnerman requires the presence of an aqueous phase because the Gunnerman process effectuates the removal of sulfur by allowing the aqueous and organic phases to separate after a sonic energy treatment, wherein the *aqueous phase ultimately contains the sulfur products*. *See col. 2, lines 26-44.* An aqueous phase is *essential* to Gunnerman because it is the means by which the oxidized sulfur is extracted from the fossil fuel. *See col. 3, lines 1-5.*

The Examiner concedes in the Final Office Action that Gunnerman *does not disclose an operation in the absence of an aqueous phase*. *See p. 5.* As is well known, references

can be modified for purposes of a Section 103 rejection only if there is some suggestion or incentive to do so. *In re Fritch*, 23 USPQ2d 1780, 1783 (Fed. Cir. 1992); *MPEP* § 2143.01. Thus, some motivation would need to be shown in order to so drastically modify the Gunnerman process as to remove the essential element of having an aqueous phase because, “impermissible hindsight must be avoided and the [conclusion of obviousness] must be reached on the basis of the facts gleaned from the prior art.” *In re Zurko*, 59 USPQ2d 1693, 1697 (Fed. Cir. 2001); *See also MPEP* § 2142. The Examiner failed to identify any teaching in the prior art or any evidence of the knowledge of one of ordinary skill in the art that would lead to this improper modification of Gunnerman. Since no evidence has been provided, the Examiner has not met his burden of establishing a *prima facie* case of obviousness.

b. *The case law cited by the Examiner does not provide the missing motivation to modify the Gunnerman reference*

In the Final Office Action, the Examiner relies on three cases to provide support for his improper finding of obviousness. These three cases are easily distinguishable from the present matter. In *Ex parte Wu*, the Board affirmed the Examiner’s finding that it would have been obvious to omit a prior art element when the function attributed to that element is not desired or required. 10 USPQ2d 2031, 2032 (BPAI 1989). The court held in *In re Larson* that if a prior art element serves a particular purpose and if that particular purpose is not desired, it would have been an obvious choice to eliminate the element and its function. 144 USPQ 347, 350 (CCPA 1965). Finally, in *In re Kuhle* the court held that if one is simplifying a prior art reference by deleting an element, and thereby deleting the element’s function, it would be an obvious expedient over the prior art. 188 USPQ 7, 9 (CCPA 1975).

In sharp contrast to the above cases, *Gunnerman absolutely requires an aqueous phase in order for its process to function as intended*, and any deletion of this element would not be a simplification or the removal of an unneeded function; in fact, the ultimate separation of the organic and aqueous phases *is the function of the Gunnerman process* and to modify the Gunnerman reference in the manner suggested by the Examiner would render Gunnerman inoperable for its intended purpose. Such proposed modifications are inappropriate for an obviousness inquiry. See *In re Gordon*, 221 USPQ 1125, 1127 (Fed. Cir. 1984).

Accordingly, The rejection of independent Claim 40 under 35 U.S.C. § 103(a) must be reversed and the subject application remanded to the Examiner with instructions to allow Claim 40.

iv. *Appellant's Dependent Claims 41-57*

Further, Appellant submits that Claims 41-57 are allowable at least for the reason that these claims depend from an allowable base claim and recite additional features that further define the present invention.

Accordingly, Appellant respectfully requests that the Board reverse the rejection of dependent Claims 41-57 under 35 U.S.C. § 103(a) and remand the subject application to the Examiner with instructions to allow such claims.

C. The rejection of Claims 58-75 under 35 U.S.C. § 103(a) as being unpatentable over Gunnerman is in error, the rejection should be reversed, and the subject application should be remanded to the Examiner with instructions to allow Claims 58-75.

i. The Examiner's Rejection of Independent Claim 58

The Examiner submits in the Final Office Action of March 14, 2006 that Gunnerman discloses a process for removing sulfur from a hydrocarbon feed by preheating the feed and contacting it with an oxidizing agent while exposing the feed to sonic energy and a nickel or tungsten catalyst at a residence time of from about 0.3 minutes to about 30 minutes at a temperature of from 70°C to 80°C at about atmospheric pressure. *See col. 3, lines 18-45; col. 4, lines 38-47; col. 5, line 23 through col. 6, line 37; example 1.*

However, the Examiner concedes that Gunnerman does not disclose that the process is operated in the absence of a surface active agent. *See Final Office Action p. 6.* To satisfy this feature, the Examiner speculates that at the time the invention was made it might have been obvious to one having ordinary skill in the art to have modified the Gunnerman process by operating the process in the absence of a surface active agent *if the function of the aqueous phase is undesirable.* *See Final Office Action p. 6.*

ii. A Review of Gunnerman

Gunnerman provides a method for reducing the sulfur content of a fossil fuel by applying ultrasound to a multiphase reaction medium containing the fossil fuel along with an aqueous fluid, a hydroperoxide oxidizing agent, and a surface active agent. *See col. 2, lines*

26-30. After receiving the ultrasound treatment, the reaction medium spontaneously separates into an organic phase, now containing the desulfurized fossil fuel, and an aqueous phase, now containing the sulfur compounds. *See col. 2, lines 31-43.*

iii. Appellant's Independent Claim 58

Appellant's independent Claim 58 recites, *inter alia*, a process for *upgrading* a crude oil fraction to *improve the performance and enhance the utility* of the crude oil fraction, said process comprising...exposing said crude oil fraction to sonic energy *in the absence of a surface active agent*. The aforementioned features recited in independent Claim 58 are not taught or suggested by Gunnerman.

a. *There is no evidence supporting the motivation to modify
Gunnerman to be practiced without the use of a surface
active agent*

Gunnerman requires the presence of a surface active agent because the Gunnerman process effectuates the removal of sulfur by allowing the aqueous and organic phases to separate after a sonic energy treatment, wherein the aqueous phase ultimately contains the sulfur products. *See col. 2, lines 26-44.* A surface active agent is essential to Gunnerman because it allows for the formation of an emulsion between the fossil fuel and the aqueous phase, thereby enabling the oxidized sulfur to be extracted from the fossil fuel. *See col. 4, line 61 to col. 5, line 1.*

The Examiner concedes in the Final Office Action that Gunnerman does not disclose an operation in the absence of a surface active agent. *See p. 6.* As is well known,

references can be modified for purposes of a Section 103 rejection only if there is some suggestion or incentive to do so. *In re Fritch*, 23 USPQ2d 1780, 1783 (Fed. Cir. 1992); *MPEP* § 2143.01. Thus, some motivation would need to be shown in order to so drastically modify the Gunnerman process as to remove the essential element of having a surface active agent because, “impermissible hindsight must be avoided and the [conclusion of obviousness] must be reached on the basis of the facts gleaned from the prior art.” *In re Zurko*, 59 USPQ2d 1693, 1697 (Fed. Cir. 2001); *See also MPEP* § 2142. The Examiner failed to identify any teaching in the prior art or any evidence whatsoever of the knowledge of one of ordinary skill in the art that would lead to this improper modification of Gunnerman. Since no evidence has been provided, the Examiner has not met his burden of establishing a *prima facie* case of obviousness.

b. *The case law cited by the Examiner does not provide the missing motivation to modify the Gunnerman reference*

In the Final Office Action, the Examiner relies on three cases to provide support for his improper finding of obviousness¹. These three cases are easily distinguishable from the present matter.

In sharp contrast to the above cases, Gunnerman requires a surface active agent in order for its process to function as intended, and any deletion of this element would not be a simplification or the removal of an unneeded function; in fact, the ultimate separation of the organic and aqueous phases is the function of the Gunnerman process and to modify the Gunnerman reference in the manner suggested by the Examiner would render Gunnerman

¹ For the sake of completely arguing each ground of rejection, these three cases and their holdings are discussed above in relation to the rejection of Claims 40-57, and later herein with respect to Claims 78-88.

inoperable for its intended purpose. Such proposed modifications are inappropriate for an obviousness inquiry. *See In re Gordon*, 221 USPQ 1125, 1127 (Fed. Cir. 1984).

*c. There is no explanation of the motivation to modify
Gunnerman to omit the use of a surface active agent*

In the Final Office Action, the Examiner speculates that Claim 58 *would* have been obvious over Gunnerman, “if the function of the aqueous phase is undesirable.” *Page 6. However, Appellant’s independent Claim 58 does not include the limitation of an aqueous phase.* The rejection is therefore nonsensical. Assuming the Examiner intended to assert an obviousness rejection if the function of a surface active agent were undesirable, that rationale is clearly without support and thus also inappropriate. As discussed above, the Examiner has not provided any evidence supporting the motivation to modify Gunnerman by removing the surface active agent, which is a required element for the functionality of the Gunnerman process.

As is well known, the record must point to some evidence establishing a suggestion or incentive in the prior art for making the proposed modification, without using the applicant’s disclosure as the road map. *See MPEP §§ 2142, 2143.01*. Not only did the Examiner not provide any such evidence, but in this rejection there is no explanation for the motivation to modify the teachings of Gunnerman to remove the essential surface active agent from the Gunnerman process.

Accordingly, the Board must reverse the rejection of independent Claim 58 under 35 U.S.C. § 103(a) and remand the subject application to the Examiner with instructions to allow Claim 58.

iv. Appellant's Dependent Claims 59-75

Further, Appellant submits that Claims 59-75 are allowable at least for the reason that these claims depend from an allowable base claim and recite additional features that further define the present invention.

Accordingly, the Board must reverse the rejection of Claims 59-75 under 35 U.S.C. § 103(a) and remand the subject application to the Examiner with instructions to allow such claims.

D. The rejection of Claims 78-88 under 35 U.S.C. § 103(a) as being unpatentable over Gunnerman is in error, the rejection should be reversed, and the subject application should be remanded to the Examiner with instructions to allow Claims 78-88.

i. The Examiner's Rejection of Claims 78-88

The Examiner submits in the Final Office Action of March 14, 2006 that Gunnerman discloses a process for removing sulfur from a hydrocarbon feed by preheating the feed and contacting it with an oxidizing agent while exposing the feed to sonic energy and a nickel or tungsten catalyst at a residence time of from about 0.3 minutes to about 30 minutes at a temperature of from 70°C to 80°C at about atmospheric pressure. *See col. 3, lines 18-45; col. 4, lines 38-47; col. 5, line 23 through col. 6, line 37; example 1.*

However, the Examiner concedes that Gunnerman does not disclose that the process is operated in the absence of an oxidizing agent. *See Final Office Action p. 6.* To

satisfy this feature, the Examiner speculates that at the time the invention was made *it would have been obvious* to one having ordinary skill in the art to have modified the Gunnerman process by operating the process in the absence of an oxidizing agent *if the function of the aqueous phase is undesirable*. See *Final Office Action* p. 6.

ii. A Review of Gunnerman

Gunnerman provides a method for reducing the sulfur content of a fossil fuel by applying ultrasound to a multiphase reaction medium containing the fossil fuel along with an aqueous fluid, a hydroperoxide oxidizing agent, and a surface active agent. See *col. 2, lines 26-30*. After receiving the ultrasound treatment, the reaction medium spontaneously separates into an organic phase, now containing the desulfurized fossil fuel, and an aqueous phase, now containing the sulfur compounds. See *col. 2, lines 31-43*.

iii. Appellant's Claims 78-88

Appellant's Claims 78-88 are dependent on base Claim 76 which recites, *inter alia*, a process for *upgrading* a crude oil fraction to *improve the performance and enhance the utility* of the crude oil fraction, said process comprising...*in the absence of an oxidizing agent*...exposing said crude oil fraction to sonic energy. The aforementioned features recited in independent Claim 76 are clearly not taught or suggested by Gunnerman, and are in fact opposite to those teachings. Accordingly, Appellant's Claims 78-88 which depend on Claim 76 are likewise not taught or suggested by Gunnerman.

a. *There is no evidence supporting the motivation to modify
Gunnerman to omit the use of an oxidizing agent*

Gunnerman requires the presence of an oxidizing agent because the Gunnerman process effectuates the removal of sulfur by oxidizing the sulfides present in the fossil fuel to sulfones which have greater solubility in the aqueous phase. *See col. 3, lines 1-5; col. 5, lines 41-46.* In no way does the Gunnerman reference give any indication that the process could be modified by removing the hydroperoxide oxidizing agent and still be functional.

In fact, the Examiner expressly concedes in the Final Office Action that Gunnerman does not disclose an operation in the absence of an oxidizing agent. *See p. 6.* As is well known, references can be modified for purposes of a Section 103 rejection only if there is some suggestion or incentive to do so. *In re Fritch*, 23 USPQ2d 1780, 1783 (Fed. Cir. 1992); *MPEP* § 2143.01. Thus, some motivation would need to be shown in order to so drastically modify the Gunnerman process as to remove the essential element of having an oxidizing agent because, “impermissible hindsight must be avoided and the [conclusion of obviousness] must be reached on the basis of the facts gleaned from the prior art.” *In re Zurko*, 59 USPQ2d 1693, 1697 (Fed. Cir. 2001); *See also MPEP* § 2142. The Office Action fails to identify any teaching in the prior art or any evidence of the knowledge of one of ordinary skill in the art that would lead to this improper modification of Gunnerman. Since no evidence has been provided, a *prima facie* case of obviousness has not been established.

b. *The case law cited by the Examiner does not provide the missing motivation to modify the Gunnerman reference*

In the Final Office Action, the Examiner relies on three cases to provide support for his improper finding of obviousness². These three cases are easily distinguishable from the present matter.

In sharp contrast to the above cases, Gunnerman requires an oxidizing agent in order for its process to function as intended, and any deletion of this element would not be a simplification or the removal of an unneeded function; in fact, the oxidation of the sulfides to sulfones so that the sulfones may be isolated in the aqueous phase is the function of the Gunnerman process and to modify the Gunnerman reference in the manner suggested by the Examiner would render Gunnerman inoperable for its intended purpose. Such proposed modifications are inappropriate for an obviousness inquiry. See *In re Gordon*, 221 USPQ 1125, 1127 (Fed. Cir. 1984).

c. *There is no explanation of the motivation to modify Gunnerman to omit the use of an oxidizing agent*

In the Final Office Action, the Examiner assumes that Claims 78-88 would have been obvious over Gunnerman, “if the function of the aqueous phase is undesirable.” Page 6. However, Claims 78-88 do not include the limitation of an aqueous phase. Like the rejection set forth above in relation to Claims 58-75 the rejection is nonsensical. Assuming, *arguendo*, the Examiner intended to assert an obviousness rejection if the function of an oxidizing agent were undesirable, that rationale is clearly without support and thus

² For the sake of completely arguing each ground of rejection, these three cases and their holdings are discussed above in relation to the rejection of Claims 40-57, and again with respect to Claims 58-75.

inappropriate. As discussed above, no evidence has been provided to support the motivation to modify Gunnerman by removing the oxidizing agent, which is a **required element** for the functionality of the Gunnerman process.

As is well known, the record must point to some evidence establishing a suggestion or incentive in the prior art for making the proposed modification, without using the applicant's disclosure as the road map. *See MPEP §§ 2142, 2143.01*. Not only does the record fail to provide any such evidence, but in this rejection there is further lacking any explanation for the motivation to modify the teachings of Gunnerman to remove the essential oxidizing agent from the Gunnerman process.

Accordingly, no basis for maintaining a rejection of these claims exists and the Board should reverse the rejection of Claims 78-88 under 35 U.S.C. § 103(a) and remand the subject application to the Examiner with instructions to allow such claims.

E. The rejection of Claims 77-81 under 35 U.S.C. § 103(a) as being unpatentable over Inoue in view of Gunnerman is in error, the rejection should be reversed, and the subject application should be remanded to the Examiner with instructions to allow Claims 77-81.

i. *The Examiner's Rejection of Claims 77-81*

The Examiner submits in the Final Office Action of March 14, 2006 that Inoue discloses a desulfurization process wherein a hydrocarbon feed (e.g., crude oil) is contacted with ultrasonic energy, wherein the process is operated at ambient temperature and pressure. *See col. 1, lines 27-38; col. 2, lines 20-44; col. 5, lines 5-8; Examples I-V.*

The Examiner further submits that Gunnerman discloses a process for removing sulfur from a hydrocarbon feed by preheating the feed and contacting it with an oxidizing agent while exposing the feed to sonic energy and a nickel or tungsten catalyst at a residence time of from about 0.3 minutes to about 30 minutes at a temperature of from 70°C to 80°C at about atmospheric pressure. *See col. 3, lines 18-45; col. 4, lines 38-47; col. 5, line 23 through col. 6, line 37; example 1.*

However, the Examiner concedes that Inoue does not disclose crude oil fraction feeds as recited in Appellant's Claims 77-81. *See Final Office Action p. 7.* To satisfy this feature, the Examiner speculates that at the time the invention was made it would have been obvious to one having ordinary skill in the art to have modified the Inoue process by utilizing a feedstock as taught by Gunnerman because any sulfur containing hydrocarbon feed can be treated in the process of Inoue. *See Final Office Action p. 7.*

ii. A Review of Inoue

Inoue discloses a method for removing sulfur from petroleum liquids by exposing the liquids to high-energy sources without substantially heating the liquids. *See col. 1, lines 51-64.* Inoue discloses that sonic vibrations alone or in combination with some other high-energy source can result in the desulfurization of the petroleum liquids. *See col. 2, lines 34-43.* Inoue also discloses that in spite of using a high-energy discharge the liquid is only minimally heated from the process and the reaction effectively occurs at ambient temperature and pressure. *See col. 2, lines 30-33.*

iii. A Review of Gunnerman

Gunnerman provides a method for reducing the sulfur content of a fossil fuel by applying ultrasound to a multiphase reaction medium containing the fossil fuel **along with an aqueous fluid, a hydroperoxide oxidizing agent, and a surface active agent.** See col. 2, lines 26-30. After receiving the ultrasound treatment, the reaction medium spontaneously separates into an organic phase, now containing the desulfurized fossil fuel, and an aqueous phase, now containing the sulfur compounds. See col. 2, lines 31-43.

iv. Appellant's Claims 77-81

Appellant's Claims 77-81 are dependent from base Claim 76 which recites, inter alia, a process for *upgrading* a crude oil fraction to *improve the performance and enhance the utility* of the crude oil fraction, said process comprising the step of **heating said crude oil fraction in the absence of an oxidizing agent**.... Appellant respectfully submits that the aforementioned features recited in independent Claim 76 are not taught or suggested by Inoue or Gunnerman. Accordingly, Appellant's Claims 77-81 which depend from Claim 76 are likewise not taught or suggested by Inoue or Gunnerman.

a. *Appellant's independent Claim 76 has been shown above to be allowable; therefore, dependent Claims 77-81 are likewise allowable*

The further rejection of Claims 77-81 under 103(a) as being unpatentable over Inoue in view of Gunnerman is improper for the reasons discussed above in relation to the

Examiner's rejection of Appellant's independent Claim 76 under 35 U.S.C. § 102(b), as well as Examiner's rejection of Claims 77-81 under 35 U.S.C. § 103(a).

In particular, Claims 77-81 which depend from Claim 76 include the step of heating the crude oil fraction. Inoue clearly does not teach heating the crude oil fraction. In fact, as discussed above, Inoue teaches away from heating the crude oil fraction. Furthermore, Claims 77-81 require the process to occur in the absence of an oxidizing agent. Gunnerman absolutely requires the presence of a hydroperoxide oxidizing agent in order to effectuate its process. To so modify Inoue and Gunnerman as to reach the process recited in Claims 77-81 would not only contradict their respective teachings but, in the case of Gunnerman would render it unsuitable for its intended purpose. Such proposed modifications are inappropriate for an obviousness inquiry. *See In re Gordon*, 221 USPQ 1125, 1127 (Fed. Cir. 1984).

Accordingly, Appellant respectfully requests that the Board reverse the rejection of Claims 77-81 under 35 U.S.C. § 103(a) and remand the subject application to the Examiner with instructions to allow such Claims.

F. The rejection of Claim 82 under 35 U.S.C. § 103(a) as being unpatentable over Inoue alone or in view of Gunnerman is in error, the rejection should be reversed, and the subject application should be remanded to the Examiner with instructions to allow Claims 82.

i. The Examiner's Rejection of Claim 82

The Examiner submits in the Final Office Action of March 14, 2006 that Inoue discloses a desulfurization process wherein a hydrocarbon feed (e.g., crude oil) is contacted

with ultrasonic energy, wherein the process is operated at ambient temperature and pressure.

See col. 1, lines 27-38; col. 2, lines 20-44; col. 5, lines 5-8; Examples I-V.

The Examiner further submits that Gunnerman discloses a process for removing sulfur from a hydrocarbon feed by preheating the feed and contacting it with an oxidizing agent while exposing the feed to sonic energy and a nickel or tungsten catalyst at a residence time of from about 0.3 minutes to about 30 minutes at a temperature of from 70°C to 80°C at about atmospheric pressure. *See col. 3, lines 18-45; col. 4, lines 38-47; col. 5, line 23 through col. 6, line 37; example 1.*

However, the Examiner concedes that Inoue does not disclose that the process has a residence time of from one second to one minute. *See Final Office Action p. 7.* To satisfy this feature, the Examiner submits that at the time the invention was made it would have been obvious to one having ordinary skill in the art to have modified the Inoue process by operating the process at the claimed residence times because it would be expected that at least one sulfur would be released from the feedstock when the resident time is one minute. *See Final Office Action p. 7.* The Examiner submits that in the alternative, it would have been obvious to one skilled in the art at the time the invention was made to have modified the process of Inoue by operating the residence times as taught by Gunnerman because such residence times are effective in the Gunnerman process. *See Final Office Action p. 7.*

ii. *A Review of Inoue*

Inoue discloses a method for removing sulfur from petroleum liquids by exposing the liquids to high-energy sources without substantially heating the liquids. *See col. 1, lines 51-64.* Inoue discloses that sonic vibrations alone or in combination with some other high-

energy source can result in the desulfurization of the petroleum liquids. *See col. 2, lines 34-43.* Inoue also discloses that in spite of using a high-energy discharge the liquid is only minimally heated from the process and the reaction effectively occurs at ambient temperature and pressure. *See col. 2, lines 30-33.*

iii. *A Review of Gunnerman*

Gunnerman provides a method for reducing the sulfur content of a fossil fuel by applying ultrasound to a multiphase reaction medium containing the fossil fuel along with an aqueous fluid, a hydroperoxide oxidizing agent, and a surface active agent. *See col. 2, lines 26-30.* After receiving the ultrasound treatment, the reaction medium spontaneously separates into an organic phase, now containing the desulfurized fossil fuel, and an aqueous phase, now containing the sulfur compounds. *See col. 2, lines 31-43.*

iv. *Appellant's Claim 82*

Appellant's Claim 82 is dependent from base Claim 76 which recites, *inter alia*, a process for *upgrading* a crude oil fraction to *improve the performance and enhance the utility* of the crude oil fraction, said process comprising the step of *heating said crude oil fraction in the absence of an oxidizing agent*.... The aforementioned features recited in independent Claim 76 *are not taught or suggested by Inoue or Gunnerman*, either alone or in combination. Accordingly, Appellant's Claim 82, which depends from Claim 76, is likewise not taught or suggested by Inoue and Gunnerman.

- a. *Appellant's independent Claim 76 has been shown above to be allowable; therefore, dependent Claim 82 is likewise allowable*

The further rejection of Claim 82 under 103(a) as being unpatentable over Inoue alone or in view of Gunnerman is improper for the reasons discussed above in relation to the Examiner's rejection of Appellant's Claims 77-81 under 35 U.S.C. § 103(a).

Claim 82, which depends from Claim 76, includes the step of heating the crude oil fraction. Inoue fails to teach heating the crude oil fraction. In fact, as discussed above, Inoue teaches away from heating the crude oil fraction. Furthermore, Claim 82 requires the process to occur in the absence of an oxidizing agent. Gunnerman absolutely requires the presence of a hydroperoxide oxidizing agent in order to effectuate its process. To so modify Inoue and Gunnerman as to reach the process recited in Claim 82 would not only contradict their respective teachings but, in the case of Gunnerman would render it unsuitable for its intended purpose. As repeatedly discussed above, such proposed modifications are inappropriate for an obviousness inquiry. *See In re Gordon*, 221 USPQ 1125, 1127 (Fed. Cir. 1984).

Accordingly, the rejection of Claim 82 under 35 U.S.C. § 103(a) must be reversed and the subject application remanded to the Examiner with instructions to allow such Claims.

VIII. CLAIMS APPENDIX

40. A process for upgrading a crude oil fraction to improve the performance and enhance the utility of the crude oil fraction, said process comprising the step of heating said crude oil fraction in the presence of an oxidizing agent while exposing said crude oil fraction to sonic energy in the absence of an aqueous phase.

41. The process of Claim 40 wherein said oxidizing agent is hydrogen peroxide or a hydroperoxide.

42. The process of Claim 40 wherein said crude oil fraction is a fraction boiling within the diesel range.

43. The process of Claim 42 wherein said crude oil fraction is a member selected from the group consisting of fluid catalytic cracking (FCC) cycle oil fractions, coker distillate fractions, straight run diesel fractions, and blends thereof.

44. The process of Claim 40 wherein said crude oil fraction is a fraction boiling within the gas oil range.

45. The process of Claim 44 wherein said crude oil fraction is a member selected from the group consisting of FCC cycle oil, FCC slurry oil, light gas oil, heavy gas oil, and coker gas oil.

46. The process of Claim 40 wherein said crude oil fraction is a member selected from the group consisting of gasoline, jet fuel, straight-run diesel, blends of straight-run diesel and FCC light cycle oil, and petroleum residuum-based fuel oils.

47. The process of Claim 40 wherein said crude oil fraction is exposed to said sonic energy from about 1 second to about 1 minute.

48. The process of Claim 41 further comprising contacting said crude oil fraction with a transition metal catalyst.

49. The process of Claim 48 wherein said transition metal catalyst is a member selected from the group consisting of metals having atomic numbers of 21 through 29, 39 through 47, 57 through 79.

50. The process of Claim 48 wherein said transition metal catalyst is a member selected from the group consisting of nickel, silver, tungsten, cobalt, molybdenum, and combinations thereof.

51. The process of Claim 48 wherein said transition metal catalyst is a member selected from the group consisting of nickel, silver, tungsten, and combinations thereof.

52. The process of Claim 40 wherein said crude oil fraction is heated to a temperature no greater than 500°C.

53. The process of Claim 40 wherein said crude oil fraction is heated to a temperature no greater than 200°C.

54. The process of Claim 40 wherein said crude oil fraction is heated to a temperature no greater than 125°C.

55. The process of Claim 40 performed at a pressure of less than 400 psia.

56. The process of Claim 40 performed at a pressure of less than 50 psia.

57. The process of Claim 40 performed at a pressure within the range of from about atmospheric pressure to about 50 psia.

58. A process for upgrading a crude oil fraction to improve the performance and enhance the utility of the crude oil fraction, said process comprising the step of heating said

crude oil fraction in the presence of an oxidizing agent while exposing said crude oil fraction to sonic energy in the absence of a surface active agent.

59. The process of Claim 58 wherein said oxidizing agent is hydrogen peroxide or a hydroperoxide.

60. The process of Claim 58 wherein said crude oil fraction is a fraction boiling within the diesel range.

61. The process of Claim 60 wherein said crude oil fraction is a member selected from the group consisting of fluid catalytic cracking (FCC) cycle oil fractions, coker distillate fractions, straight run diesel fractions, and blends thereof.

62. The process of Claim 58 wherein said crude oil fraction is a fraction boiling within the gas oil range.

63. The process of Claim 62 wherein said crude oil fraction is a member selected from the group consisting of FCC cycle oil, FCC slurry oil, light gas oil, heavy gas oil, and coker gas oil.

64. The process of Claim 58 wherein said crude oil fraction is a member selected from the group consisting of gasoline, jet fuel, straight-run diesel, blends of straight-run diesel and FCC light cycle oil, and petroleum residuum-based fuel oils.

65. The process of Claim 58 wherein said crude oil fraction is exposed to said sonic energy from about 1 second to about 1 minute.

66. The process of Claim 59 further comprising contacting said crude oil fraction with a transition metal catalyst.

67. The process of Claim 66 wherein said transition metal catalyst is a member selected from the group consisting of metals having atomic numbers of 21 through 29, 39 through 47, 57 through 79.

68. The process of Claim 66 wherein said transition metal catalyst is a member selected from the group consisting of nickel, silver, tungsten, cobalt, molybdenum, and combinations thereof.

69. The process of Claim 66 wherein said transition metal catalyst is a member selected from the group consisting of nickel, silver, tungsten, and combinations thereof.

70. The process of Claim 58 wherein said crude oil fraction is heated to a temperature no greater than 500°C.

71. The process of Claim 58 wherein said crude oil fraction is heated to a temperature no greater than 200°C.

72. The process of Claim 58 wherein said crude oil fraction is heated to a temperature no greater than 125°C.

73. The process of Claim 58 performed at a pressure of less than 400 psia.

74. The process of Claim 58 performed at a pressure of less than 50 psia.

75. The process of Claim 58 performed at a pressure within the range of from about atmospheric pressure to about 50 psia.

76. A process for upgrading a crude oil fraction to improve the performance and enhance the utility of the crude oil fraction, said process comprising the step of heating said crude oil fraction in the absence of an oxidizing agent while exposing said crude oil fraction to sonic energy.

77. The process of Claim 76 wherein said crude oil fraction is a fraction boiling within the diesel range.

78. The process of Claim 77 wherein said crude oil fraction is a member selected from the group consisting of fluid catalytic cracking (FCC) cycle oil fractions, coker distillate fractions, straight run diesel fractions, and blends thereof.

79. The process of Claim 76 wherein said crude oil fraction is a fraction boiling within the gas oil range.

80. The process of Claim 79 wherein said crude oil fraction is a member selected from the group consisting of FCC cycle oil, FCC slurry oil, light gas oil, heavy gas oil, and coker gas oil.

81. The process of Claim 76 wherein said crude oil fraction is a member selected from the group consisting of gasoline, jet fuel, straight-run diesel, blends of straight-run diesel and FCC light cycle oil, and petroleum residuum-based fuel oils.

82. The process of Claim 76 wherein said crude oil fraction is exposed to said sonic energy from about 1 second to about 1 minute.

83. The process of Claim 76 wherein said crude oil fraction is heated to a temperature no greater than 500°C.

84. The process of Claim 76 wherein said crude oil fraction is heated to a temperature no greater than 200°C.

85. The process of Claim 76 wherein said crude oil fraction is heated to a temperature no greater than 125°C.

86. The process of Claim 76 performed at a pressure of less than 400 psia.

87. The process of Claim 76 performed at a pressure of less than 50 psia.

Application No.: 10/644,255
Attorney Docket: CULLN-001B

88. The process of Claim 76 performed at a pressure within the range of from about atmospheric pressure to about 50 psia.

IX. EVIDENCE APPENDIX

No evidence is being submitted herewith.

X. RELATED PROCEEDINGS APPENDIX

No decisions have been rendered by a court or the Board in the related proceedings identified in Paragraph II.

XI. CONCLUSION

In view of the foregoing, none of the references of record, when considered either alone or in any proper combination thereof, anticipates or renders obvious the Appellant's invention as recited in Claims 40-88. The applied references of record have been discussed and distinguished, while significant claimed features of the present invention have repeatedly been pointed out.

As such, each and every appealed claim of the present invention meets the requirements for patentability under 35 U.S.C. §§ 102 and 103. Appellant therefore requests that all of the aforementioned rejections be reversed by the Board, and that the application be remanded to the Examiner for withdrawal of the rejections.

Accordingly, allowance of the present application and the above-mentioned claims therein is respectfully requested and believed to be appropriate.

If any additional fee is required, please charge Deposit Account Number 19-4330.

Respectfully submitted,

Date: 5/25/06

By:



Matthew A. Newboles

Registration No. 36,224

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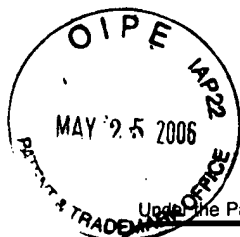
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Application Number

10/644,255

Filing Date

AUGUST 20, 2003

First Named Inventor

MARK CULLEN

Group Art Unit

1764

Examiner Name**Total Number of Pages in This Submission****Attorney Docket Number**

CULLN-001B

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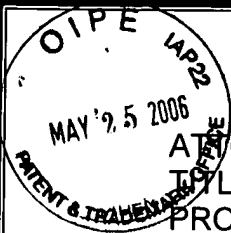
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Serial Number: 10/644,255

Filed: August 20, 2003

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☒ Applicant claims small entity status. See 37 CFR 1.27TOTAL AMOUNT OF PAYMENT (\$ 250.00 ~~000X~~)**Complete if Known**

Application Number	10/644,255
Filing Date	AUGUST 20, 2003
First Named Inventor	MARK CULLEN
Examiner Name	TAM M. NGUYEN
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Application Type	FILING FEES		SEARCH FEES		EXAMINATION FEES		Fees Paid (\$)
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Design	200	100	100	50	130	65	
Plant	200	100	300	150	160	80	
Reissue	300	150	500	250	600	300	
Provisional	200	100	0	0	0	0	

2. EXCESS CLAIM FEES

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Each independent claim over 3 or, for Reissues, each independent claim more than in the original patent	200	100
Multiple dependent claims	360	180

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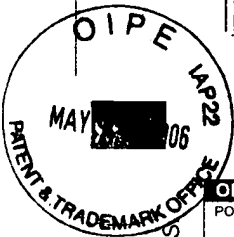
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